

LISTING OF CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently amended) A heating apparatus (1) for the conductive heating of ~~a melts (39), in particular for the rapid melting down, refining and/or conditioning of melts (39), which apparatus comprises, comprising:~~

~~at least one electrode (3), characterized in that the heating apparatus (1) has at least; and~~

~~a first cooling system with means for controlling the a cooling power variably as a function of time and location in a plurality of selectable regions of the at least one electrode (3).~~

2. (Currently amended) The heating apparatus as claimed in claim 1, ~~characterized in that~~ wherein the first cooling system comprises a fluid-delivery device (21), ~~which preferably allows the~~ for delivering a cooling fluid to be delivered at low pressure differences of up to 1 000 mbar, ~~preferably up to 500 mbar, most preferably up to 150 mbar.~~

3. (Currently amended) The heating apparatus as claimed in claim 2, ~~characterized in that~~ wherein the fluid-delivery device (21) can be set and/or controlled ~~in particular with respect to~~ a variable selected from the group consisting of a the temperature, ~~the a liquid content and/or the, a~~ quantitative flow of the cooling fluid, and any combinations thereof.

4. (Currently amended) The heating apparatus as claimed in claim 2 ~~or 3,~~ ~~characterized in that~~ wherein the first cooling system comprises a multiplicity of first fluid-conducting passages (10).

5. (Currently amended) The heating apparatus as claimed in claim 4, ~~characterized in that at least portions (10) of~~ wherein the multiplicity of first fluid-conducting passages (10) include portions that run transversely with respect to one another in different planes.

6. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 5, characterized in that at least one~~ claim 4, wherein the multiplicity of first fluid-conducting passages (10) is are connected to a device for setting and/or controlling the a through-flow of the cooling fluid.

7. (Currently amended) The heating apparatus as claimed in claim 6, ~~in which~~ wherein the device for setting and/or controlling the through-flow of the cooling fluid comprises a setting or control valve ~~(13)~~.

8. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 7, characterized in that~~ claim 1, wherein the first cooling system comprises air cooling and/or liquid cooling and/or aerosol cooling.

9. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 8, characterized in that it includes a~~ claim 1, further comprising a second cooling system and means for setting and/or controlling the first and second cooling systems independently of one another.

10. (Currently amended) The heating apparatus as claimed in claim 9, ~~characterized in that the further~~ wherein the second cooling system comprises a multiplicity of second fluid-conducting passages ~~(12)~~.

11. (Currently amended) The heating apparatus as claimed in claim 10, ~~characterized in that at least sections (18) of~~ wherein the multiplicity of second fluid-conducting passages (12) of the further cooling system comprise sections that run transversely with respect to sections (19) of the multiplicity of first fluid-conducting passages (10) of the first cooling system, preferably in a direction perpendicular to the heat propagation direction.

12. (Currently amended) The heating apparatus as claimed in claim 10, ~~characterized in that at least sections (18) of~~ wherein the multiplicity of second fluid-conducting passages (12) of the further cooling system comprises sections that run parallel to sections (19) of the multiplicity of first fluid-conducting passages (10) of the first cooling system, preferably in a direction perpendicular to the heat propagation direction.

13. (Currently amended) The heating apparatus as claimed in claim 12, ~~characterized in that at least~~ wherein the sections (18) of the multiplicity of second fluid-conducting passages (12) of the further cooling system and the sections (19) of the multiplicity of first fluid-conducting passages (10) of the first cooling system are guided into one another.

14. (Currently amended) The heating apparatus as claimed in ~~one of claims 10 to 13,~~ claim 10, ~~characterized in that~~ wherein the multiplicity of first and second fluid-conducting passages (10) are arranged in such a way that at least a section (19) of the multiplicity of first fluid-conducting passages (10) of the first cooling system is arranged closer to the a melt contact surface (17) of the at least one electrode (3) than the multiplicity of second fluid-conducting passages (12) of the further cooling system.

15. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 14,~~ claim 1, ~~characterized in that~~ wherein the at least one electrode (3) comprises a supporting apparatus (5).

16. (Currently amended) The heating apparatus as claimed in claim 15, ~~characterized in that~~ wherein the supporting apparatus (5) is arranged on a side of the at least one electrode (3) that is remote from the a melt contact surface (17) of the at least one electrode.

17. (Currently amended) The heating apparatus as claimed in ~~one of~~ claims 15 or 16, ~~characterized in that~~ claim 15, wherein the supporting apparatus (5) is of a multilayer structure.

18. (Currently amended) The heating apparatus as claimed in claim ~~18~~ 15, ~~characterized in that~~ wherein the support apparatus (5) includes a first layer (51), which is arranged between the at least one electrode (3) and at least one subsequent second layer (52) of the supporting apparatus (5), the first layer (51) having a higher thermal conductivity than the at least one subsequent second layer (52).

19. (Currently amended) The heating apparatus as claimed in claim ~~19~~ 18, ~~characterized in that~~ wherein the first layer (51) comprises a fused-cast and/or dense-sintered material, ~~in particular AZS or Al₂O₃ or HZFC~~.

20. (Currently amended) The heating apparatus as claimed in ~~one of~~ claims 15 to 19, ~~in which that~~ claim 16, wherein the side of the at least one electrode (3) ~~which that~~ is remote from the melt contact surface (17) bears against one side (20) of the supporting apparatus (5), ~~characterized in that at least a section (19) of a fluid-conducting passage (10) extends along this~~ and wherein the one side (20) of the supporting apparatus (5) has at least a section of a fluid-conducting passage extending therealong.

21. (Currently amended) The heating apparatus as claimed in claim 20, ~~characterized in that wherein the section (19) of the at least one fluid-conducting passage (10) is open toward the at least one electrode (3) or, in the case of a supporting apparatus (5) of multilayer structure, toward a first layer (51), arranged between electrode (3) and at least one subsequent second layer (52), of the supporting apparatus (5).~~

22. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 21,~~ characterized in that claim 1, wherein the at least one electrode (3) comprises at least two electrode segments (61, 63).

23. (Currently amended) The heating apparatus as claimed in claim 22, ~~characterized in that wherein the at least two electrode segments (61, 63) are insulated with respect to one another.~~

24. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 23,~~ characterized in that claim 1, wherein the at least one electrode (3) includes a melt contact material (2) ~~which that~~ comprises a material selected from the group consisting of an electrically conductive ceramic, such as for example SnO₂ ceramic, and/or refractory metals, in particular high-melting metals, in particular tungsten, molybdenum, osmium, hafnium, tantalum or alloys thereof, and/or platinum metals, in particular platinum, iridium, rhodium, or alloys thereof any of the foregoing, and any combinations thereof.

25. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 24,~~ characterized in that claim 1, wherein the at least one electrode (3) includes a melt contact material (2) which comprises a fine-grain-stabilized material, ~~in particular a high-strength platinum material or iridium material.~~

26. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 25~~, characterized in that claim 1, wherein the at least one electrode ~~(3)~~ forms a wall region of a crucible, in particular of a skull crucible.

27. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 26~~, characterized by claim 1, further comprising at least one temperature sensor, in particular a thermocouple.

28. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 27~~, characterized in that claim 1, wherein the at least the first cooling system comprises at least one flowmeter.

29. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 28~~, characterized by claim 1, further comprising a heating power control, in particular heating current control for controlling the a heating current as a function of a variable selected from the group consisting of the cooling power, the a melting temperature of the melt, and/or the an electrode temperature, and any combinations thereof.

30. (Currently amended) The heating apparatus as claimed in ~~one of the preceding claims~~, characterized by claim 1, further comprising a device for heating the at least one electrode ~~(3)~~.

31. (Currently amended) The heating apparatus as claimed in claim 30, characterized in that wherein the device for heating the at least one electrode ~~(3)~~ comprises an ohmic heating device which is suitable for heating the melt or glass contact material and/or parts of the at least one electrode itself.

32. (Currently amended) The heating apparatus as claimed in claim 30 or 31, characterized in that wherein the device for heating the at least one electrode ~~(3)~~ comprises a device for heating the cooling fluid.

33. (Currently amended) The heating apparatus as claimed in ~~one of claims 1 to 32~~, characterized in that it can be fitted into the wall (42) of a melting unit (40) and claim 1, wherein the heating apparatus forms part of the a wall (42) of the a melting unit (40).

34. (Currently amended) The heating apparatus as claimed in claim 33, characterized in that the further comprising edges of the heating device (1) apparatus that are cooled in the region in which they adjoin the walls (42) of the melting unit (40).

35. (Currently amended) A melting unit (40) for the conductive heating of a melts (39), comprising: ~~at least one heating apparatus (1) as claimed in one of the preceding claims~~

an electrode; and

a cooling system having a controller that controls a cooling power variably as a function of time and location in a plurality of selectable regions of the at least one electrode.